UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P O Box 1450
Alexandria, Virginia 22313-1450
www uspto gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/713,355	11/17/2003	Munehiro Tabata	040356-0496	9164

22428 7590 12/23/2008
FOLEY AND LARDNER LLP
SUITE 500
3000 K STREET NW
WASHINGTON, DC 20007

EXAMINER	
NGUYEN, TU MINH	

ART UNIT	PAPER NUMBER
3748	

MAIL DATE	DELIVERY MODE
12/23/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/713,355
Filing Date: November 17, 2003
Appellant(s): TABATA ET AL.

Thomas G. Bilodeau
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed on September 26, 2008 appealing from the Office action mailed on April 17, 2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

2003/0113249	HEPBURN ET AL.	6-2003
6,574,956	MORAAL ET AL.	6-2003
6,938,411	HOFFMANN ET AL.	9-2005
6,594,990	KUENSTLER ET AL.	7-2003

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

1. Claims 15, 16, 24, and 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn et al. (U.S. Patent Application 2003/0113249) in view of Moraal et al. (U.S. Patent 6,574,956).

Re claims 15, 27, and 28, as shown in Figures 1, 2, 4, and 6A, Hepburn et al. disclose a purification device for an exhaust gas of a diesel engine (12) and a method for controlling said purification device, the diesel engine comprising a catalyst (19, 54) which traps nitrogen oxides in the exhaust gas but decreases a nitrogen oxides trapping performance when poisoned by sulfur oxides in the exhaust gas, and a filter (19, 42) which traps particulate matter in the exhaust gas, the device comprising a programmable controller (34) programmed to:

- determine (step 224) if an elimination of the sulfur oxides poisoning the catalyst is required;

- perform a process of eliminating the sulfur oxides poisoning the catalyst, when elimination of the sulfur oxides poisoning the catalyst has been determined to be required (step 224 with YES answer, step 226, step 236 with YES answer, step 238, and steps 264-274);

- determine (step 274) if a regeneration of the filter is required while performing the process of eliminating the sulfur oxides;

- perform the regeneration of the filter while interrupting the process of eliminating the sulfur oxides, when the regeneration of the filter has been determined to be required (step 274 with YES answer, step 276, and steps 278-282);

- determine (step 282) during the regeneration of the filter if a residual particulate matter in the filter has decreased to a level; and

- stop the regeneration of the filter and resume the process of eliminating the sulfur oxides poisoning the catalyst, when a residual particulate matter in the filter has decreased to said level (step 282 with YES answer, step 284, step 286 with NO answer, and steps 264-274).

Hepburn et al., however, fail to disclose that during the regeneration of the filter, said level is an amount of residual particulate matter in the filter above which the filter is allowed to be regenerated without causing thermal damage to the filter.

As indicated on lines 31-34 of column 1, Moraal et al. teach that it is conventional in the art to interrupt a regeneration cycle of a particulate filter if the filter temperature exceeds a temperature range having an ignition temperature as a lower limit (lines 49-51 of column 3) and a critical threshold as an upper limit. It is obvious that at a time of interruption, the filter is at a predetermined decrease state corresponding to a particulate matter trap amount smaller than a predetermined amount (an amount that activates the regeneration cycle) and larger than zero

(when fully regenerated). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching by Moraal et al. in the device of Hepburn et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to prevent thermal degradation to the filter.

Re claim 16, in the modified purification device of Hepburn et al., the process of eliminating the sulfur oxides poisoning the catalyst is performed by causing the catalyst to contact with an exhaust gas corresponding to a rich air-fuel ratio, and the regeneration of the filter is performed by burning a trapped particulate matter by causing the filter to contact with an exhaust gas corresponding to a lean air-fuel ratio (see Figure 6A and paragraph 0071).

Re claim 24, in the modified purification device of Hepburn et al., the controller is further programmed to determine that the residual particulate matter in the filter has decreased to a level which does not damage the filter, when the exhaust gas has been maintained in a state corresponding to the lean air-fuel ratio for a predetermined time (DPMCNT_PRD).

Re claim 29, in the modified purification device of Hepburn et al., the diesel engine is used for driving a vehicle, and the controller is further programmed to determine that the elimination of the sulfur oxides poisoning the catalyst is required on the basis of a fuel consumption amount of the diesel engine after the latest elimination of sulfur oxides poisoning (see steps 212 and 214 and paragraph 0057).

2. Claims 17 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn et al. in view of Moraal et al. as applied to claim 16 above, and further in view of Hoffmann et al. (U.S. Patent 6,938,411).

Re claim 17, the modified purification device of Hepburn et al. discloses the invention as cited above, however, fails to disclose that the device further comprises a sensor that detects a differential pressure between an inlet and an outlet of the filter, and the controller is further programmed to determine if the regeneration of the filter is required based on the differential pressure.

As shown in Figure 1, Hoffmann et al. disclose a system for removing NOx, SOx, and particulates from the lean exhaust gas of teach an internal combustion engine, comprising a NOx trap (3) and a particulate filter (4). Hoffmann et al. further teach that the system further comprises a sensor (7) that detects a differential pressure between an inlet and an outlet of the filter, and the controller is further programmed to determine if the regeneration of the filter is required based on the differential pressure. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the teaching taught by Hoffmann et al. in the modified purification device of Hepburn et al., since the use thereof would have been routinely practiced by those with ordinary skill in the art to accurately determine a timing to regenerate the filter.

Re claim 26, in the modified purification device of Hepburn et al., the controller (34) is further programmed to determine that the residual particulate matter in the filter has decreased to a level which does not damage the filter (when step 282 has YES answer), when the controller started to generate the exhaust gas corresponding to the rich air-fuel ratio for the first time.

3. Claims 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn et al. in view of Moraal et al. as applied to claim 16 above, and further in view of Kuenstler et al. (U.S. Patent 6,594,990).

Re claim 20, the modified purification device of Hepburn et al. discloses the invention as cited above, however, fails to disclose that the device further comprises an intake throttle that regulates an intake air amount of the engine, and the controller is further programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust gas corresponding to the lean air-fuel ratio through control of the intake throttle.

As shown in Figures 1-2, Kuenstler et al. disclose a method for regenerating a diesel particulate filter (10) located at an exhaust path of a diesel engine (5). Kuenstler et al. further teach that their engine comprises an intake throttle (2) that regulates an intake air amount of the engine during a regeneration control of the filter, and a controller is further programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust gas corresponding to the lean air-fuel ratio through control of the intake throttle (in step 27). It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized the invention of Hepburn et al. in the engine taught by Kuenstler et al., since the use thereof would have provided an effective means to remove both NOx and particulate matter in an exhaust gas stream.

Re claim 21, the modified purification device of Kuenstler et al. further comprises a fuel injector (6) which injects fuel into the exhaust gas of the engine, and the controller is further programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust gas corresponding to the lean air-fuel ratio through control of a fuel injection amount of the fuel injector.

Re claim 22, in the modified purification device of Kuenstler et al., the engine comprises an exhaust gas recirculation passage (EGR system) which recirculates part of the exhaust gas

into an intake air according to an exhaust gas pressure of the engine, the purification device further comprises an exhaust throttle (3) which regulates the exhaust gas pressure, and the controller is further programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust gas corresponding to the lean air-fuel ratio through control of the exhaust throttle (in step 25).

Re claim 23, the modified purification device of Kuenstler et al. further comprises a fuel injector (6) which supplies fuel for combustion, and the controller is further programmed to generate the exhaust gas corresponding to the rich air-fuel ratio and the exhaust gas corresponding to the lean air-fuel ratio through control of a post-injection by the fuel injector after fuel is supplied for combustion (in step 30).

4. Claims 18-19 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn et al. in view of Moraal et al. as applied to claim 16 above, and further in view of legal precedent.

Re claims 18-19, the modified device of Hepburn et al. discloses the invention as cited above, however, fails to disclose that the exhaust gas corresponding to the rich air-fuel ratio corresponds to an exhaust gas produced by combustion of an air-fuel mixture wherein an excess air factor is within the range 0.95 to 1.0; and that the exhaust gas corresponding to the lean air-fuel ratio, corresponds to an exhaust gas produced by combustion of an air-fuel mixture wherein an excess air factor is within the range 1.05 to 1.1.

Hepburn et al. disclose the claimed invention except for specifying an optimum range of excess air factor of 0.95 to 1.0 and 1.05 to 1.1 for the rich air-fuel ratio condition and the lean air-fuel ratio condition, respectively. It would have been obvious to one having ordinary skill in

the art at the time the invention was made to provide a specific optimum range of excess air factor for each of the rich air-fuel ratio and the lean air-fuel ratio condition, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Re claim 25, in the modified purification device of Hepburn et al., the controller is further programmed to determine that the regeneration of the filter is required when the particulate matter trap amount is saturated. Hepburn et al., however, fail to disclose that the residual particulate matter in the filter has decreased to the level which does not damage the filter when the particulate matter trap amount is zero.

Hepburn et al. disclose the claimed invention except for specifying that a particulate matter trap amount is zero is a level at which a regeneration of the filter does not damage the filter. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a specific optimum value of residual particulate matter in the filter to terminate the filter regeneration, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

(10) Response to Argument

<u>ISSUE</u>: With regard to the 35 U.S.C. 103 rejection of base claims 15, 27, and 28, Hepburn et al. and Moraal et al. fail to disclose or teach all of the features and limitations in the claims.

In response to the Appellant's argument that Hepburn et al. fail to disclose or teach a programmable controller programmed to "determine if a regeneration of the filter is required while performing the process of eliminating the sulfur oxides" (pages 5-6 of the Appeal Brief), the examiner respectfully disagrees.

In Hepburn et al., they monitor a catalyst (19) in step 224 to determine if the catalyst is saturated with SOx. When the catalyst is indeed saturated with SOx, they perform a routine shown in Figure 4B, where an accumulated amount of SOx is monitored in step 236 to determine if a combined SOx and particulate matter purge (SOXREG1-PMREG1) should be executed. In this combined purge, which is depicted in Figure 4C, a process of eliminating SOx stored in the catalyst is performed first. During this process, a timer is monitored in step 274 to determine if an intermediate SOx purge has been sufficiently performed. If the answer in step 274 is YES (i.e., if a SOx intermediate purge time has exceeded a threshold time (DSOXCNT_PRD), a regeneration of the catalyst to burn off an accumulated particulate matter would follow while the process of eliminating SOx is interrupted (see step 276 and steps 278-282). After burning off the particulate matter for a predetermined time period (DPMCNT_PRD) (step 282 with YES answer), the process of eliminating SOx is resumed in step 284 and step 286 with NO answer. The examiner has concluded that in step 274, Hepburn et al. clearly determine if a regeneration of the catalyst to remove particulate matter is required while performing a process of eliminating the SOx. In this step, <u>the monitoring of a SOx purge time against a threshold time (DSOXCNT_PRD) during a SOX purge is a means for Hepburn et al. to determine if a regeneration of the catalyst to remove particulate matter is required</u> (emphasis added). Thus, in a broad reasonable interpretation of the claim language, Hepburn et al. indeed disclose or teach the

claimed limitation in dispute. Claims in a pending application are given their broadest reasonable interpretation. See *In re Pearson*, 181 USPQ 641 (CCPA 1974).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Tu M. Nguyen/

Tu M. Nguyen

Primary Examiner

Art Unit 3748

tmn
December 18, 2008

Conferees:

/Thomas E. Denion/
Thomas Denion
Supervisory Patent Examiner
Art Unit 3748

/Heather C. Shackelford/
Heather C. Shackelford
Conferree
Technology Center 3700